V14.2

# MACHINE SPECIFICATIONS (SELECTION SHEET)

# PUMA 4100MA [LMA] PUMA 4100MB [LMB] PUMA 4100MC [LMC]

#### HORIZONTAL TURNING CENTER

Draft	Correction	Approval
진 명식	ZME	ash
9/5	9/5	9/5

Confirmed by Control Technology Team 1

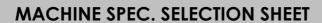
Issued by Product Development Team 1

Date: Sep. 2014

DOOSAN INFRACORE CO., LTD.

# HORIZONTAL TURNING CENTER

# **PUMA 4100M [LM]**





#### 1 GENERAL SPECIFICATION

	ITEM		HAUT	SPECIFICATION			er.	I ECTION
	ITEM		UNIT	PUMA 4100MA [LMA]	PUMA 4100MB [LMB]	PUMA 4100MC [LMC	SE	LECTION
CAPACITY	SWING OVER BED		mm		790			
	SWING OVER SADDLE		mm		590			
	MAX. TURNING DIAMETER		mm		560			
	RECOMMENDED TURNING DIAME	TER	mm	315	380	380		
	MAX. TURNING LENGTH		mm	1014 [2064]	978 [2028]	959 [2009]		
	MAX. ALLOWABLE	CHUCK WORK	kg	400	700	900		
	WORKPIECE WEIGHT (INCLUDING CHUCK)	SHAFT WORK	kg	1,100 [1,600 <sup>(3)</sup> ]	1,700 [2,000 <sup>(3)</sup> ]	2,200 [2,700 <sup>(3)</sup> ]		
	BAR WORKING DIAMETER		mm	102	116.5	165.5		
ΓRAVEL	X-AXIS		mm		352 (72+280)	I		
	Z-AXIS		mm		1105 [2155]			
	C-AXIS		deg		360 (in 0.001)			
ACCURACY	POSITIONING	X-AXIS	mm		0.01			
		Z-AXIS	mm		0.02		D	EFAULT
		C-AXIS	deg	0.0167 +/-0.002				
	REPEATABILITY	X-AXIS	mm					
		Z-AXIS	mm		+/-0.003			
		C-AXIS	deg		+/-0.006			
	LENGTH		mm		4654 [5774]			
MACHINE DIMENSION	WIDTH		mm		2055 [2275]		-	
DIWERTOIOIT	HEIGHT		mm		2194 [2,222]			
MACHINE WEIGHT	(NET) <sup>(1)</sup>		kg	9,600 [11,100]	10,100 [11,600]	10,600 [12,100]		
HEIGHT FROM FLO	OOR TO SPINDLE CENTER		mm		1,127	I		
	BED SLANT ANGLE		deg		45			
BASE STRUCTURE	GUIDEWAY TYPE		-		BOX GUIDE			
UTILITY	CONTROL POWER		-		3Ph-AC220V / 60Hz			
	REQUIRED POWER CAPACITY		kVA	43.18 [45.06]	43.18 [45.06]	51.98 [53.86]	STD.	
			kVA	43.18 [45.06]	51.98 [53.86]	-	ОРТ.	SELECTIVE
		PRESSURE	Мра		0.5	<u> </u>		
	COMPRESSED AIR SUPPLY	CONSUMPTION <sup>(2)</sup>	NL/min		50		-  D	EFAULT
MACHINE COLOR			-	MT II MT M MT	OOSAN 4-TONE COLO DARK GRAY (5.3PB 3.0 IDDLE GRAY (1.4RP 4 LIGHT GRAY (7.3B 7.8 MT BLUE (6.1PB 5.9/7.0	0/0.4) .8/0.1) s/0.4)	STD.	SELECTIVE
					USER DEFINED		OPT.	
0110 00:17					FANUC 32i		STD.	05: - 5-
CNC CONTROL			-		OOSAN-FANUC i Serie	es	OPT.	SELECTIVE

<sup>(1)</sup> The machine weight is measured with standard accessories and features fitted.

<sup>(2)</sup> Compressed air consumption is measured in standard specification. The actual value may differ from the specified here, depending on the optional features and peripheral equipment. Please contact Doosan or your regional manager.

<sup>(3)</sup> This value is based on using steady rest.

#### 2. MAIN SPINDLE

	ITEM		UNIT	SPECIFICATION PUMA 4100MA [LMA]PUMA 4100MB [LMB]PUMA 4100MC [LMC]			SE	LECTION
MAIN SPINDLE	DRIVE MECHANISM		-	-	BELT-DRIVE	-		
	STANDARD CHUCK SIZE		mm	315(12")	380(15")	530(21")	-	
	SPINDLE NOSE		ASA	A2-11	A2-11	A1-15	-	
	SPINDLE BEARING DIAMETER (FR	ONT)	mm	160	180	240	-	
	SPINDLE THROUGH HOLE DIAMET	ER	mm	115	132	181	-	
	SPINDLE SPEED		r/min	3000	2000	1500	D	EFAULT
	BORE OF DRAW TUBE		mm	103	117.5	166.5	-	
	C-AXIS CONTOURING TORQUE	Max. (without Brake)	N·m	832	1611	2432	-	
		Min. (with Low Brake)	N·m	589	1333	2159	-	
	C-AXIS BRAKING TORQUE		N·m	970	1113	1091	-	
	C-AXIS MINIMUM INDEXING INCREMENT		deg.		0.001	I	-	
SPINDLE MOTOR	STANDARD MOTOR	MOTOR TYPE	-	P50	P60	30+BF GB		
		MOTOR POWER (30min/CONT.)	kW	30 / 22	30 / 22	37 / 30	-	
		HIGH WINDING POWER RANGE	r/min	718.6~2994	333~2000	580.8 ~ 1500	-	
		LOW WINDING POWER RANGE	r/min	344~898	177.8~666.7	145.2 ~ 757.6	STD.	
		HIGH GEAR RATIO	-	1:1.67	1:2.25	1:1.98	-	
		LOW GEAR RATIO	-	-	-	1:7.92	-	
		MAX. SPINDLE TORQUE FOR TURNING	N·m	832	1611	2432		CELECTIVE
	OPTIOM MOTOR	MOTOR TYPE	-	22+BF GB	30+BF GB	N/A		SELECTIVE
	(BARUFFALDI GEAR BOX)	MOTOR POWER (30min/CONT.)	kW	26 / 22	37 / 30	N/A		
		HIGH WINDING POWER RANGE	r/min	974 ~3000	580.8 ~ 2000	N/A		
		LOW WINDING POWER RANGE	r/min	243.9 ~975.6	145.2 ~ 757.6	N/A	OPT.	
		HIGH GEAR RATIO	-	1:1.54	1:1.98	N/A	1	
		LOW GEAR RATIO	-	1:6.15	1:7.92	N/A		
		MAX. SPINDLE TORQUE FOR TURNING	N·m	1018	2432	N/A		

# 3. TAIL STOCK

	ITEM		UNIT	SPECIFICATION PUMA 4100MA [LMA] PUMA 4100MB [LMB] PUMA 4100MC [LMC	STD. SELECT	LECTION
TAIL STOCK 1	DRIVING MECHANISM			MANUAL (DRIVE BAR + CARRIAGE)		
(MANUAL)	QUILL DIAMETER		mm	120		
	QUILL TRAVEL		mm	120	etn	
	TAIL STOCK TRAVEL		mm	1000 [2050]	310.	
	MAX. QUILL THRUST FORCE	QUILL THRUST FORCE		14.3		
	QUILL CYLINDER AREA		cm <sup>2</sup>	26.5		SELECTIVE
TAIL STOCK 2	DRIVING MECHANISM			PROGRAM (DRIVE BAR + CARRIAGE)		SELECTIVE
(PROGRAMMABLE	QUILL DIAMETER		mm	120		
	QUILL TRAVEL		mm	120	OPT	
	TAIL STOCK TRAVEL		mm	1000 [2050]	JOP1.	
	MAX. QUILL THRUST FORCE		kN	14.3		
	QUILL CYLINDER AREA		cm <sup>2</sup>	26.5	— OPT.	
TAIL STOCK	TAIL STOCK CENTER	LIVE CENTER	MT	#6	STD.	SELECTIVE
CENTER		BUILT-IN TYPE DEAD CENTER	MT	#5	OPT.	SELECTIVE

#### 4. TURRET

	ITEM		UNIT	SPECIFICATION PUMA 4100MA [LMA]PUMA 4100MB [LMB]PUMA 4100MC [LMC]	SELECTION	
MILLING TURRET	1 TOOL HOLDER MOUNT TYPE		-	BMT 75P		
(STANDARD)	NUMBER OF TOOL STATIONS		ea	12		
	CURVIC COUPLING DIAMETER		mm	282		
	TURRET CLAMPING FORCE		kN	98		
	TURRET INDEX MOTOR		-	RG28TC (Servo)		
	TURRET INDEX MOTOR POWER		kW	2.8		
	ROTARY TOOL MOTOR POWER (1.5min/2.5min/18min/Cont.)		kW	23/15/11/7.5		
	GEAR RATIO		-	1:1		
	MAX. ROTARY TOOL SPEED		r/min	4000	DEFAULT	
	MAX. ROTARY TOOL TORQUE		N·m	146		
	TURRET INDEXING TIME	1-STATION SWIVEL	sec	0.25		
		1-STATION TIME	sec	0.9		
		FULL STATION INDEX	sec	1.9		
	OD TOOL SIZE		mm	25 x 25		
	MAX. BORING BAR SIZE		mm	Ф60		
		COLLET TYPE & SIZE	mm	ER40 (Ф4 - Ф20,Ф22,Ф25)		
	ROTARY TOOL	MAX. END MILL DIAMETER	mm	Ф25		
	CAPACITY	MAX. DRILL DIAMETER	mm	Ф25		
		MAX. TAP SIZE	mm	M30 X P3.5		

## 5. AXES SYSTEM

	ITEM	М	UNIT	SPECIFICATION PUMA 4100MA [LMA] PUMA 4100MB [LMB] PUMA 4100MC [LMC	SE	LECTION		
RAPID TRAVERS	SE RATE	X-AXIS	m/min	16				
		Z-AXIS	m/min	20 [18]				
		C-AXIS	r/min	50				
RAPID TRAVERS	SE RATE	X-AXIS	msec	96	1			
ACCELERATION	I/DECELERATION TIME	Z-AXIS	msec	96				
		C-AXIS	msec	240				
MAX. CUTTING I	FEEDRATE	X-AXIS	mm/rev	500	1			
		Z-AXIS	mm/rev	500				
		C-AXIS	deg/min	4,800				
CONTINUOUS T	HRUST FORCE	X-AXIS	N	15,551				
		Z-AXIS	N	16,965 [17,907]	D	DEFAULT		
INTERMITTENT THRUST FORCE		X-AXIS	N	24,881				
		Z-AXIS	N	27,143 [28,651]				
BALLSCREW (DI	IAMETER X LEAD)	X-AXIS	mm	40 X 8				
		Z-AXIS	mm	50 X 10 [50 X12]				
SERVO MOTOR	POWER	X-AXIS	kW	4				
		Z-AXIS	kW	7.0 [6.0]				
GEAR RATIO		X-AXIS	-	1:1				
		Z-AXIS	-	1:1				
FEEDBACK	ENCODER	ALL AXES	-	ABSOLUTE	D	EFAULT		
SYSTEM	LINEAR SCALE	X-AXIS	-	(HEIDENHAIN)	OPT.	SELECTIVE		
		Z-AXIS	-	(HEIDENHAIN)	OPT.	SELECTIVE		
GUIDE WAY SPA	AN	BED(Z-AXIS)	mm	420				
		SADDLE(X-AXIS)	mm	360	DEFAULT			
		BED(TAIL STOCK)	mm	300				

## 6. OIL HYDRAULIC SYSTEM

	ITEM	UNIT	SPECIFICATION PUMA 4100MA [LMA] PUMA 4100MB [LMB] PUMA 4100MC [LMC]	SELECTION
HYDRAULIC	TANK CAPACITY	L	14	
	PUMP TYPE	-	PISTON PUMP	
	MOTOR CAPACITY	kW	2.2	
	OPERATING PRESSURE	Мра	4	DEFAULT
	COOLING SYSTEM	-	RADIATOR + FAN	
	FLOW RATE	L/min	25 / 23 (60 / 50Hz)	
	VISCOSITY GRADE OF OIL	-	ISO VG32	
LUBRICATION	TANK CAPACITY	L	4.3	
	PUMP TYPE	-	Gear Pump	
	PUMP MOTOR POWER	W	120	
	DISCHARGE PRESSURE	Мра	1.6±0.1	DEFAULT
	DISCHARGE VOLUME	L/min	0.1 (60 / 50Hz)	
	VISCOSITY GRADE OF OIL	-	ISO VG68	
	DISTRIBUTOR TYPE	-	METERING	

## 7. COOLANT SYSTEM

	ITEN		LIAUT	SPECIFICATION		TI FOTION
	ITEN		UNIT	PUMA 4100MA [LMA] PUMA 4100MB [LMB] PUMA 4100MC [LM	IC]	ELECTION
COOLANT TANK	RIGHT DISPOSAL	TANK CAPACITY	L	280 [370]		DEFAULT
		COOLANT OIL	TYPE	WELL-CUT B 30		DLI AULT
COOLANT	PUMP1 (1.5 BAR) <sup>(1)</sup>	PUMP MOTOR POWER	kW	0.4	STD.	
PUMP FOR		FILTRATION	Mesh	20 (TANK SCREEN FILTER)		
IAIN TURRET		MAX. PRESSURE	Мра	0.15 / 0.1 (60 / 50 Hz)		
		MAX. FLOW RATE	L/min	40		
	PUMP 2 (4.5 BAR) <sup>(1)</sup>	PUMP MOTOR POWER	kW	0.9	OPT.	
		FILTRATION	Mesh	20 (TANK SCREEN FILTER)		
		MAX. PRESSURE	Мра	0.45 / 0.3 (60 / 50 Hz)		
		MAX. FLOW RATE	L/min	30		
	PUMP 3 (7 BAR) <sup>(1)</sup>	PUMP MOTOR POWER	kW	1.5	OPT.	
		FILTRATION	Mesh	20 (TANK SCREEN FILTER)		
		MAX. PRESSURE	Мра	0.7 / 0.5 (60 / 50 Hz)		
		MAX. FLOW RATE	L/min	30		
	PUMP 4 (10 BAR) <sup>(1)</sup>	PUMP MOTOR POWER	kW	2.2	OPT.	
		FILTRATION	Mesh	20 (TANK SCREEN FILTER)		05150
		MAX. PRESSURE	Мра	1.0 / 0.7 (60 / 50 Hz)		SELECT
		MAX. FLOW RATE	L/min	30		
	PUMP 5 (14.5 BAR) <sup>(1)</sup>	PUMP MOTOR POWER	kW	3.7	OPT.	
		FILTRATION	Mesh	20 (TANK SCREEN FILTER)		
		MAX. PRESSURE	Мра	1.45 / 1.0 (60 / 50 Hz)		
		MAX. FLOW RATE	L/min	30		
	PUMP 6 (28 BAR) <sup>(1)</sup>	PUMP MOTOR POWER	kW	4	OPT.	
		FILTRATION	μm	20(TANK SCREEN FILTER)		
		MAX. PRESSURE	Мра	2.8 / 1.95 (60 / 50 HZ)		
		MAX. FLOW RATE	L/min	20		
	PUMP 7 (70 BAR) <sup>(1)</sup>	PUMP MOTOR POWER	kW	5.5	OPT.	
		FILTRATION	μm	25 (DUAL BAG FILTER) WITH CLOGGING ALARM		
	MAX. PRESSURE Mpa 7	7				
		MAX. FLOW RATE	L/min	30		

# 7. COOLANT SYSTEM (CONTINUED)

	ITEM		UNIT	SPECIFICATION PUMA 4100MA [LMA] PUMA 4100MB [LMB] PUMA 4100MC [LM	SE C]	ELECTION
COOLANT	PUMP 8 (70 BAR) <sup>(1)</sup>	PUMP MOTOR POWER	kW	7.5	OPT.	
PUMP FOR		FILTRATION	μm	10 (PAPER FILTER)		SELECTIVE
MAIN TURRET		MAX. PRESSURE	MPa	7.0		SELECTIVE
		MAX. FLOW RATE	L/min	20		
COOLANT	COOLANT CHILLER*		SET	1	OPT.	SELECTIVE
OPTION	OIL SKIMMER		SET	1	OPT.	SELECTIVE
	COOLANT PRESSURE SWITCH		SET	1		SELECTIVE
	COOLANT LEVEL SWITCH		SET	1	OPT.	SELECTIVE

<sup>(1)</sup> MEASURED AT PUMP OUTLET WITH 60Hz POWER.

## 8. WORK HOLDING DEVICE

	ITEM		UNIT				LECTION	
	IIEW		UNII	PUMA 4100MA [LMA]	PUMA 4100MB [LMB	PUMA 4100MC [LMC]	30	ELECTION
	STANDARD CHUCKING WITH SEOAM	CHUCK SPEC. ( STROKE)	- (mm)	CGH-12 (24)	CAH-15 (23)	CGH-21 (23)	STD.	
		CYLINDER SPEC. (STROKE)	- (mm)	YSGH-12 (35)	YSHL-15 (50)	YSHL-21 (51)		
HYDRAULIC	OPTION CHUCKING	CHUCK SPEC. ( STROKE)	- (mm)	MH-212 (23)	HCH-15 (23)	MH-221 (23)	OPT.	
CHUCK FOR	WITH SAMCHULLY	CYLINDER SPEC. (STROKE)	- (mm)	SH21010 (35)	SHL-25011 (50)	SYHL-2816 (51)		
MAIN SPINDLE	OPTION CHUCKING	CHUCK SPEC.(STROKE)	- (mm)	N/A	CAHA-18 (23)	N/A	OPT.	
	WITH SEOAM BIGGER CHUCK	CYLINDER SPEC.(STROKE)	- (mm)	N/A	YSHL-15 (50)	N/A		SELECTIVE
	OPTION CHUCKING WITH SAMCHULLY BIGGER CHUCK	CHUCK SPEC.(STROKE)	- (mm)	N/A	HCH-18 (23)	N/A	OPT.	SELECTIVE
		CYLINDER SPEC.(STROKE)	- (mm)	N/A	SHL-25011 (50)	N/A		
	OPTION CHUCKING WITHOUT CHUC	CHUCK SPEC.(STROKE)	- (mm)	-	-	-	ОРТ.	
		CYLINDER SPEC.(STROKE)	- (mm)	SH21010 (35)	SHL-25011 (50)	SYHL-2816 (51)		
	TWIN CHUCKING*		-		ORDER MADE		OPT.	
	SPECIAL CHUCKING*		-	PLE	EASE CONTACT DOO	SAN	OPT.	
	DUAL PRESSURE CHUCKING		-	•			OPT.	SELECTIVE
	CHUCK CLAMP CONFIRMATION		-	•		OPT.	SELECTIVE	
	HARDENED & GROUND HARD JAWS		SET	1			OPT.	SELECTIVE
	SOFT JAW <sup>(1)</sup>		SET	1			STD.	DEFAULT
STEADY REST	MANUAL STEADY REST	TYPE 1 (Ø25 ~ Ø200)	SET		•		OPT.	SELECTIVE
		TYPE 2 (Ø50 ~ Ø260)	SET		•		OPT.	
	HYDRAULIC STEADY REST	SLU-3 (Ø16 ~ Ø152)	SET		•		OPT.	
		SLU-3.1 (Ø20 ~ Ø165)	SET		•		OPT.	_
		SLU-4 (Ø35 ~ Ø245)	SET		•		OPT.	OELECTIVE
	PROGRAMMABLE STEADY REST	SLU-3 (Ø16 ~ Ø152)	SET		•		OPT.	SELECTIVE
	(FOLLOW TYPE)	SLU-3.1 (Ø20 ~ Ø165)	SET		•		OPT.	
		SLU-4 (Ø35 ~ Ø245)	SET		•		OPT.	1

<sup>(1)</sup> EACH CHUCK COMES WITH 1SET OF SOFT JAWS AS STANDARD. DEPENDS ON SELECTED CHUCK TYPE, ITS SUPPLYING CAN BE DIFFERENT.

<sup>(2)</sup> THE COOLANT PUMP IS USED FOR OPTIONAL FEATURES SUCH AS COOLANT FLUSHING, TSC OF BOTH SPINDLE, COOLANT BLOWER.

# 9. CHIP DISPOSAL

	ITEM		UNIT	SPECIFICATION PUMA 4100MA [LMA] PUMA 4100MB [LMB] PUMA 4100MC [LMC	SE	ELECTION
CHIP CONVEYOR	RIGHT DISPOSAL	HINGED BELT TYPE FOR STEEL	SET	1	OPT.	
		MAGNETIC SCRAPER TYPE FOR CAST IRON	SET	1	OPT.	SELECTIVE
		SPECIAL CHIP CONVEYOR*	SET	ORDER MADE	OPT.	
CHIP BUCKET	CAPACITY	FORKLIFT	L	220	OPT.	
			L	300	OPT.	
			L	380	OPT.	
		ROTATION	L	220	OPT.	SELECTIVE
			L	300	OPT.	
			L	380	OPT.	
AIR BLOWER	MAIN SPINDLE CHUCK JAW CLEANIN	G	SET	1	OPT.	SELECTIVE
CHUCK COOLANT	MAIN SPINDLE CHUCK JAW CLEANIN	G	SET	1	OPT.	SELECTIVE
COOLANT GUN			SET	1	OPT.	SELECTIVE
MIST	INTERFACE (DUCT ONLY)		SET	1 (Φ150mm)	OPT.	SELECTIVE
COLLECTOR	INTEGRATED MIST COLLECTOR		SET	1 (Φ150mm)	OPT.	SELECTIVE

#### **10. OPTIONAL EQUIPMENTS**

	ITEM	UNIT	SPECIFICATION		SF	LECTION
	TI EM	ONT	PUMA 4100MA [LMA] PUMA 4100MB [LMB	PUMA 4100MC [LMC]	O.	LECTION
MEASUREMENT	MANUAL TOOL SETTER (MAIN,REMOVABLE)	SET	1	N/A	OPT.	SELECTIVE
	AUTO TOOL SETTER (MAIN, HYDRAULIC)	SET	1		OPT.	SELECTIVE
	IN-MACHINE WORKPIECE MEASURING SYSTEM*	SET	1 (OLP40)		OPT.	SELECTIVE
OTHERS	AIR GUN	SET	1		OPT.	SELECTIVE
	AIR LIMIT	SET	1		OPT.	SELECTIVE
	AUTOMATIC FRONT DOOR WITH SAFETY DEVICE	SET	1			SELECTIVE
	AUTOMATIC POWER OFF	SET	1		OPT.	SELECTIVE
	PRESSURE SWITCH FOR CHUCKING PRESSURE CHECK	SET	1		OPT.	SELECTIVE
	ROTARY TYPE WINDOW WIPER	SET	1		OPT. S OPT. S OPT. S	SELECTIVE
	SIGNAL TOWER (YELLOW, RED, GREEN)	SET	1		OPT.	SELECTIVE
	TOOL MONITORING SYSTEM	SET	1		OPT.	SELECTIVE

#### 11. STANDARD ACCESSORIES

ITEM	UNIT	SPECIFICATION PUMA 4100MA [LMA]PUMA 4100MB [LMB]PUMA 4100MC [LMC]	SELECTION
FOOT SWITCH	SET	Single	DEFAULT
FRONT GUARD DOOR INTER LOCK	SET	1	
FULL ENCLOSURE CHIP AND COOLANT SHIELD	SET	1	
HAND TOOL KIT(INCLUDING SMALL TOOL FOR OPERATIONS)	SET	1	
LEVELING JACK SCREW & PLATES	SET	1	
MANUALS	SET	1	
SAFETY PRECAUTION NAME PLATES	SET	1	
WORK LIGHT	SET	2	

#### < NOTE >

- 1. DESIGNS AND SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.
- 2. ALL VALUES SPECIFIED IN THE DOCUMENT ARE VALID FOR STANDARD ELECTRIC POWER CONDITIONS.(60Hz, 220V)
- 3. IF YOU HAVE ANY QUESTION REGARDING CONTENTS OR SELECT \* MARKED CONTENT, PLEASE CONTACT DOOSAN.MACHINE TOOLS
- 4. MACHINE LAY-OUT AND WEIGHT CAN BE CHANGED DEPENDING ON OPTIONS AND PERIPHERAL EQUIPMENT.
- 5. PLEASE REFER TO LAY-OUT AND FOUNDATION DRAWING REGARDING INSTALLATION/ELECTRIC DEVICE.
- 6. PRESSURE AND FLOW RATE VALUES OF COOLANT AND HYDRAULIC PUMP ARE GIVEN AT PUMP OUTLET.
- 7. THE FLOW RATE AND THE PRESSURE OF COOLANT SPECIFIED IN THE DOCUMENT ARE VALID FOR WATER SOLUBLE COOLANT.
- 8. REFER TO THE SEPARATED SPEC. SHEETS TO REVIEW SPECIFICATION, FUNCTION AND OPTION OF CNC CONTROLLER.